

AMENDMENTS TO THE CLAIMS:

Please amend Claims 1, 10, 11, 16, 27, and 51-54, and add new Claims 66-70 as follows. In accordance with the revised amendment format, all claims are presented below.

1. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on
a same single semiconductor substrate,
wherein each of said plurality of image pickup elements includes a
plurality of pixels which include photoelectric conversion units respectively and are
arranged two-dimensionally, and a scan circuit which supplies a common read-out pulse
sequentially to a plurality of pixels arranged in a first direction, and
wherein said scan circuit is arranged between two photoelectric
conversion units included in the same a single image pickup elements element and is not
arranged between the photoelectric conversion units arranged respectively at end portions of
two image pickup elements adjacent to each other, and wherein a width of a space between
the photoelectric conversion units between which said scan circuit is arranged is shorter
than a pitch of each of the pixels.
2. (Cancelled)
3. (Cancelled)

4. (Original) An apparatus according to claim 1, wherein said scan circuit comprises a shift register.

5. (Original) An apparatus according to claim 4, wherein the shift register is of static type.

6. (Original) An apparatus according to claim 1, wherein said scan circuit comprises a decoder.

7-9 (Cancelled)

10. (Currently Amended) An apparatus according to claim 52, wherein said scan circuit comprises vertical and horizontal scan circuits, and the vertical scan circuit is bent so as not to cross the horizontal scan circuit.

11. (Currently Amended) An apparatus according to claim 52, wherein said scan circuit comprises vertical and horizontal scan circuits, and the horizontal scan circuit is bent so as not to cross the vertical scan circuit.

12. (Previously Amended) An apparatus according to claim 1, wherein said scan circuit is arranged along a plurality of photoelectric conversion units arranged in a second direction, different from the first direction.

13. (Cancelled)

14. (Cancelled)

15. (Original) An apparatus according to claim 1, wherein an electric power supply line is arranged on said scan circuit.

16. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on
a same single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, a plurality of first common output lines each provided to a column of photoelectric conversion units, and a plurality of transfer switches which transfer signals from said plurality of pixels first common output lines sequentially to a second common output line, and

wherein each of said plurality of transfer switches is arranged between two photoelectric conversion units included in the same a single image pickup element and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

17-21 (Cancelled)

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22. (Previously Amended) An apparatus according to claim 16, wherein an electric power supply line is arranged on said plurality of transfer switches.

23. (Previously Amended) An apparatus according to claim 1, further comprising a scintillator plate and fiber optic plate provided in front of said plurality of image pickup elements.

24. (Previously Amended) An apparatus according to claim 16, further comprising a scintillator plate and fiber optic plate provided in front of said plurality of image pickup elements.

25. (Previously Amended) An apparatus according to claim 23, further comprising:

 a signal processing circuit adapted to process signals from said plurality of image pickup elements;

 a recording circuit adapted to record a signal from said signal processing circuit;

 a display circuit adapted to display the signal from said signal processing circuit; and

 a radiation source adapted to generate radiation.

26. (Previously Amended) An apparatus according to claim 24, further comprising:

a signal processing circuit adapted to process signals from said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

27. (Currently Amended) An image pickup apparatus comprising:

a plurality of image pickup elements each of which are is formed on a same single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and a protection circuit, and

wherein said protection circuit is arranged between two photoelectric conversion units included in ~~the same~~ a single image pickup element and is not arranged between ~~the~~ photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

28. (Original) An apparatus according to claim 27, wherein said protection circuit comprises a protection resistor.

29. (Original) An apparatus according to claim 27, wherein said protection circuit comprises a protection diode.

30. (Previously Amended) An apparatus according to claim 53, wherein said external terminal has a bump.

31-38 (Cancelled)

39. (Previously Amended) An apparatus according to claim 54, wherein said external terminal and said protection circuit are arranged side by side.

40. (Previously Amended) An apparatus according to claim 54, wherein said external terminal and said protection circuit overlap each other.

41-43 (Cancelled)

44. (Previously Amended) An apparatus according to claim 54, wherein a protection resistor is interposed between said external terminal and said protection circuit.

45. (Cancelled)

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46. (Original) An image pickup apparatus for dividing an object image into a plurality of regions to form one image, wherein external terminals which are connected to a wiring line sandwiched between boundary sides of first and second regions and are arranged in the first region, are not at the same positions in a direction along the boundary sides as external terminals which are connected to another wiring line sandwiched between the boundary sides and are arranged in the second region.

47. (Original) An apparatus according to claim 27, further comprising a scintillator plate and a fiber optic plate.

48. (Original) An apparatus according to claim 46, further comprising a scintillator plate and a fiber optic plate.

49. (Original) An apparatus according to claim 47, further comprising:
a signal processing circuit adapted to process a signal from said image pickup region;
a recording circuit adapted to record a signal from said signal processing circuit;
a display circuit adapted to display the signal from said signal processing circuit; and a radiation source adapted to generate radiation.

50. (Original) An apparatus according to claim 48, further comprising:
a signal processing circuit adapted to process a signal from said
image pickup region;
a recording circuit adapted to record a signal from said signal
processing circuit;
a display circuit adapted to display the signal from said signal
processing circuit; and
a radiation source adapted to generate radiation.

51. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on
a same single semiconductor substrate,
wherein each of said plurality of image pickup elements includes a
plurality of pixels which include photoelectric conversion units respectively and are
arranged two-dimensionally, a plurality of first common output lines each provided to a
column of photoelectric conversion units, a plurality of transfer switches which transfer
signals from said plurality of pixels first common output lines sequentially to a second
common output line, and a scan circuit which supplies pulses sequentially to said plurality
of transfer switches, and
wherein said scan circuit is arranged between two photoelectric
conversion units included in the same a single image pickup elements element and is not
arranged between the photoelectric conversion units arranged respectively at end portions
of two image pickup elements adjacent to each other, and wherein a width of a space

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between the photoelectric conversion units between which said scan circuit is arranged is shorter than a pitch of each of the pixels.

52. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on
a same single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are rearranged arranged two-dimensionally, a vertical scan circuit which supplies a common read-out pulse to the pixels arranged in one direction, a plurality of first common output lines each provided to a column of photoelectric conversion units, a plurality of transfer switches which transfer signals from said plurality of pixels first common output lines sequentially to a second common output line, ~~and a horizontal scan circuit which supplies pulses sequentially to a common output line~~, and a horizontal scan circuit which supplies pulses sequentially to said plurality of transfer switches, and

wherein said vertical scan circuit ~~and~~ said horizontal scan circuit are is arranged between two photoelectric conversion units included in the same a single image pickup element, and said horizontal scan circuit is arranged between photoelectric conversion units included in the single image pickup element, and neither said vertical scan circuit or said horizontal scan circuit are not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other, and

wherein a width of a space between the photoelectric conversion

units between which said vertical scan circuit is arranged, and a width of a space between the photoelectric conversion units between which said horizontal scan circuit is arranged is shorter than a pitch of each of the pixels.

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53. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on a same single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and an external terminal, and

wherein said external terminal is arranged between two photoelectric conversion units included in the same a single image pickup element and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

54. (Currently Amended) An image pickup apparatus comprising:
a plurality of image pickup elements each of which are is formed on a same single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, a protection circuit and an external terminal, and

wherein said protection circuit and said external terminal are arranged between two photoelectric conversion units included in the same a single image

pickup element and are not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other, and wherein a width of a space between the photoelectric conversion units between which said protection circuit and said external terminal are arranged is shorter than a pitch of each of the pixels.

55. (Previously Added) An apparatus according to Claim 51, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

56. (Previously Added) An apparatus according to Claim 52, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

57. (Previously Added) An apparatus according to Claim 53, further comprising a scintillator plate and fiber optic plate, provided in front of said plurality of image pickup elements.

58. (Previously Added) An apparatus according to Claim 54, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

59. (Previously Added) An apparatus according to Claim 55, further comprising:

a signal processing circuit adapted to process signals from said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

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60. (Previously Added) An apparatus according to Claim 56, further comprising:

a signal processing circuit adapted to process signals from said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

61. (Previously Added) An apparatus according to Claim 57, further comprising:

a signal processing circuit adapted to process signals from said

plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal

processing circuit;

a display circuit adapted to display the signal from said

signal processing circuit; and

a radiation source adapted to generate radiation.

62. (Previously Added) An apparatus according to Claim 58, further

comprising:

a signal processing circuit adapted to process signals from said

plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal

processing circuit;

a display circuit adapted to display the signal from said signal

processing circuit; and

a radiation source adapted to generate radiation.

63. (Previously Added) An apparatus according to Claim 51, wherein

said scan circuit comprises a shift register.

64. (Previously Added) An apparatus according to Claim 63, wherein

the shift register is of static type.

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65. (Previously Added) An apparatus according to Claim 51, wherein

said scan circuit comprises a decoder.

66. (New) An image pickup apparatus comprising:

a plurality of image pickup elements each of which is formed on a single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include respective photoelectric conversion units and are arranged two-dimensionally in horizontal and vertical directions, and a scan circuit which supplies, sequentially in the vertical direction, a read-out pulse common to a plurality of pixels arranged in a horizontal direction,

wherein said scan circuit includes first and second partial scanning circuits, and

wherein said first and second partial scanning circuits are each arranged between photoelectric conversion units arranged in the vertical direction included in a single image pickup element, and between photoelectric conversion units arranged in the horizontal direction included in the single image pickup element, and are not arranged between photoelectric conversion units arranged respectively at end portions of image pickup elements adjacent to each other.

67. (New) An apparatus according to claim 66, further comprising:

a signal processing circuit adapted to process signals from said plurality of image pickup elements;

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a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

68. (New) An image sensing apparatus for sensing a radiation image, comprising:

a plurality of image pickup elements each of which is formed on a single semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include respective photoelectric conversion units and are arranged two-dimensionally in horizontal and vertical directions, and a scan circuit which supplies, sequentially in the vertical direction, a read-out pulse common to a plurality of pixels arranged in the horizontal direction, and

wherein said scan circuit includes a shift register of a static type, is arranged between photoelectric conversion units included in a single image pickup element, and is not arranged between photoelectric conversion units arranged respectively at end portions of image pickup elements adjacent to each other.

69. (New) An apparatus according to claim 68, wherein the radiation image includes an X-ray image.

70. (New) An apparatus according to claim 68, further comprising:
a single processing circuit adapted to process signals from said
plurality of image pickup elements;
a recording circuit adapted to record a signal from said signal
processing circuit;
a display circuit adapted to display the signal from said signal
processing circuit; and
a radiation source adapted to generate radiation.
